Descriptions of GIS Mine Polygons Used in the Cumulative Impact Study

Kentucky

Original Source Description

The Department for Surface Mining Reclamation and Enforcement (DSMRE) currently makes available scanned and georeferenced mining and reclamation plan maps and annual underground maps for permits issued by the Department. Mining and reclamation plan (MRP) maps are required to be submitted with an application for a permit to conduct surface coal mining and reclamation operations in the Commonwealth of Kentucky. MRP maps are generally drawn on an enlarged USGS seven and one-half (7 1/2) minute topographic map at a scale of between 400 and 600 feet to the inch. Permitted surface and underground mine boundaries and facilities associated with coal mining operations are shown along with names and locations of streams and other bodies of water, roads, buildings, cemeteries, oil and gas wells, public parks, public property, and utility lines.

The source of the GIS mine polygons for Kentucky used in this cumulative impact study are the surface mining overlay maps maintained by the Kentucky Department of Surface Mining Reclamation and Enforcement (DSMRE). These maps consist of frosted mylar sheets that overlay 7 ½ minute USGS topographic maps. DSMRE staff draw permitted surface and underground mine boundaries and selected other features in ink onto the mylar. DSMRE GIS specialist scanned and georeferenced these mylar overlays, which are now available to the pubic for downloading. Here is the site link where the scanned may be downloaded: http://kydsmre.nr.state.ky.us/gis/data.htm. MRP maps georeferenced beginning in July 2002, and all georeferenced underground maps are projected in the NAD83 Kentucky Single Zone Coordinate System. MRP maps processed prior to July 2002 were georeferenced in NAD83 Kentucky State Plane North or South zone coordinates.

Currently six series of overlays are available both in hardcopy and digitally. Each series represents a time period in the permitting of surface coal mining in Kentucky.

- ◊ Series I: Areas permitted from 1977 to March 1, 1981, and which were active as of January 1, 1981.
- ◊ Series II: Areas permitted from 1961 to 1977, and which were inactive as of January 1, 1981.
- ◊ Series III: Areas permitted from March 1, 1981 through January 18, 1983.
- ◊ Series IV: Areas permitted under the permanent program after January 18, 1983 and through April 1, 1986.

- ◊ Series V: Areas permitted under the new permanent program after April 1, 1986 and through August 1, 1995.

- ◊ Series VI: Areas permitted after August 1, 1995 and through August 31, 1999.

- ◊ Series VII Areas permitted after September 1, 1999 and through April 30, 2000. (Series VII has been converted to GIS polygons by DSMRE.)

For the purposes of the cumulative impact analysis only the information from Series VI and VII were used. Series VI consists of three primary overlay sheets: (1) Polygon Layer - closed polygons - permit boundaries, etc… (2) Line Data Layer - lineal lines - roads, conveyors, utilities, etc… and (3) Point Data Layer - small ponds, sampling sites, mine adits, etc. Overlaying permits will be drawn on separate sheets of Mylar, thus there may be more than one polygon layer sheet (Sheet 1, Sheet 2, etc…). Hatched lines denote underground shadow areas. Areas of less than full recovery have a greater opening between hatch marks and recovery percentage is indicated.

DESCRIPTION OF MAP SYMBOLS AND CODES

The mining overlay maps are identified by the 7 ½ minute quadrangle name. Alpha characters are assigned to each permit number and appear as the first portion of the attribute code assigned to each map feature. The alpha codes are generally listed in alphabetic order and expand to multi-lettered codes (AA, BB etc.) to include all permits pertaining to a given quadrangle. Alpha codes and the specific permit number to which they correspond are listed at the bottom of the overlay. Adjacent maps that share the same permit boundary have, in most cases, the same alpha code on both maps. The number which follows the alpha code is a one-, two- or three-digit number defining the major category in which a mining feature falls (i.e. mining, fill areas, haul roads, etc.). Often a sub-category is used to describe a mining feature in greater detail. An example of a feature attribute code is ‘A-610’. The code refers to a sediment structure (6), embankment type (10), within the permit number assigned ‘A’. Areas common to more than one permit number are labeled with the alpha character and feature attribute codes of both permit numbers with a comma placed between them.

The permit features are drawn as dashed lines, solid lines, dash-dot-dot lines, or single dots. Haul roads and railroads are drawn as dashed lines unless they correspond to the permit boundary, in which case the permit boundary takes precedence. Features that appear as solid lines or polygons include mining areas, fill/storage areas, permit boundary areas, face-ups, and reference areas. Points are used to represent features of small acreage such as sediment structures, monitoring points and underground mine openings. Hatched lines indicate underground areas.

Due to the influx of new mining permits and the absence of some permits at the time of drafting, these overlays are not 100% comprehensive. The updating procedure (acreage additions and deletions) was initialized to keep the mining operations overlays as up-to-date as possible.

PERMIT MAPPING CODES

1—Contour Mining Area
2—Area Mining Area
3—Mountaintop Removal Area
4—Augering Area
5—Fill area
57 – General Fill/Spoil Storage Area/Refuse Area
58 –Hollow fill
59—Topsoil Storage
510—General/Temporary/Equipment Storage Area
6—Sediment Structure
69—Sediment Type
610—Embankment Type
611—Dugout
612—Rock Check Dam
613—Diversion Ditch
616—Combination Diversion Ditch
618—Pole Structure
620—Earth Dam
7—Access/Haul Road
8—Monitoring Point
81—Surface Water Monitoring Point
82—Biology Monitoring Point
83—Groundwater Monitoring Point
84—Geologic Sampling Point
85—Surface/Biology Monitoring Point
9—Permit Boundary Area
0—Other Features
06—Underground Mine Opening
Adits [Y] - leg of Y in direction of mine opening
Air shafts [V]
014—Reference Area
015—Face-Up Area / Re-grade Area
017—Wildlife Habitat
019—Railroad
021—Coal Stockpile
030—Underground Mine Area
040—Mine Management Area
050—Prep Plant

As previously mentioned, Kentucky DSMRE converted the Series 7 digital and geo-referenced mylars to GIS polygons. Series 7 GIS data is described below:

The GIS data consists of the boundaries of permitted surface and underground mines and other selected features for permits issued between September 1, 1999 and April 30, 2000. Kentucky DSMRE used ArcView 3.1 software to create the Series 7 GIS data. Information describing each permit is contained in the dBASE file include the following:

SHAPE - layer type
CODE - mine feature*
FACILITY_ID - mine feature id
PERMIT - permit number

* mine feature codes

FU	Face Up
LO	Load Out
MM	Mine Management Area
PP	Prep Plant
SA	Surface Area
SBK	Spoil Bank Fill
SC	Surface Contour
SG	Surface Auger
SM	Surface Mountaintop
Slide	Slide
Spoil	Spoil
Stockpile	Stockpile
UG	Underground

Kentucky DSMRE forewarns the users of the digital information that the maps available for download do not comprise a complete set of maps that may be available. Additional hardcopies of these or other MRP or annual underground maps may be obtained by contacting: Daryl Hines, Christina Rice, or Amy Covert at (502) 564-2320 in the Kentucky Department for Surface Mining Reclamation and Enforcement.

Description of Digital Data Base Queried for the Cumulative Impact Study

Staff from OSM's Pittsburgh Office downloaded the Series VII and VI digital information from KY DSMRE FTP server on October 7, 2002, and October XXX, respectively.

The Series VII GIS data was filtered to retain only those mining disturbances associated with surface mining activities. All polygons associated with the activities coded as "face up", "load out", "prep plant", "surface auger", "slide", "stockpile", or "underground" were deleted from consideration for the purpose of the cumulative impact analysis. Further, using the boundaries of the EIS study area in Kentucky, a GIS specialist at OSM Pittsburgh Office used readily available querying tools in ESRI ARCVIEW software to

select only those surface mining permits that were located wholly or partly within the EIS study area. This filtered digital data for Series VII, which consisted of multiple polygons for surface mines, were forwarded to EPA's Wheeling Office.

The Series VI scanned and georeferenced mylars posed a more challenging task. Staff from OSM Pittsburgh Office used specialized software (Able Software R2V for Windows) to convert the digital picture images (rasters) to vectorized features (polygons, lines, and points). Once converted to GIS polygons, features representing surface mining disturbances were retained and other disturbances (such as underground mining, preparation plants, augering areas, face-up areas, stockpiles, ect) were eliminated. Further, using the boundaries of the EIS study area in Kentucky, a GIS specialist at OSM Pittsburgh Office used readily available querying tools in ESRI ARCVIEW software to select only those surface mining permits that were located wholly or partly within the EIS study area. This filtered digital data for Series VII, which consisted of multiple polygons for surface mines, were forwarded to EPA's Wheeling Office.

Below is a list of digital mining polygons from Kentucky forwarded for inclusion in the cumulative impact study.

SERIES 7 PERMITS

Permit ID	Permit ID	Permit ID	Permit ID
9180346	8670390	8980507	8970358
8885022	8980446	8600034	8130010
8970369	8665025	8985167	8360265
8988106	8070265	8675172	8660240
8970390	8670383	8930093	8955002
8980450	8670402	8950141	8070236
8640096	8980467	8800103	8980446
8600359	8480151	8800130	8670394
8600349	8610454	8605201	8360249
8130220	8970388	8980488	8980481
8605198	8985694	8605223	8800117
8950139	8480200	8985908	8600377
8980516	8360261	8678021	8260530
8980469	8670399	8985913	8670377
8600374	8970376	8480191	8600369
8130246	8970396	8615297	8130249
8130246	8980444	8980565	8670257
8600316	8980450	8660229	8615273
8070097	8800132	9180375	8130240
8980492	8980490	8630277	8160109
8675225	8580135	8605154	8920100
8485327	8980479	8130257	8360231
8600034	8970357	8480140	8130226
8365197	8585056	8980545	8480179

SERIES 6 PERMITS

Permit ID	Permit ID
864012	8649000
845005	8800014
1111111	8800023
4800093	8800034
4805070	8800043
4805074	8800103
6805009	8800108
6805012	8800109
6807001	8800130
8320043	8805058
8320144	8805059
8450050	8805126
8580151	8805137
8580152	8805138
8589999	8805139
8640096	8805144
8640107	8805148
8640115	8805150
8640117	8807000
8640124	8880078
8640132	
8640135	
8640142	
8648016	